Forest Research Notes

Northeastern Forest
Experiment Station
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A SIMPLE FILTER DAM FOR SMALL STREAMS

Research foresters on the Fernow Experimental Forest were recently faced with the problem of conducting a logging job with "poor" skidroad standards on a 38-acre watershed above a municipal water-supply reservoir.

To carry out the research assignment with a minimum of damage to the water supply, possibilities of removing or holding back the sediment after it got into the stream were investigated.

In general, water supply people consider it impractical to remove sediment from natural streamflow because of the great fluctuations in flow and the fact that higher flows usually have higher turbidities. It is usually easier to treat only that part of the flow that actually enters the water mains. Thus solution of the Fernow problem could not be based on experience elsewhere.

A number of different methods for filtering out the sediment were considered and tested on a small scale. As a result, four simple filter dams were installed in the lower reaches of the small stream, three above a weir pond and one below. Here the stream has a gradient of about 10 percent, and rather steep banks.

The filter dams were constructed of small logs, posts, stock wire, and straw (figs. 1 and 2). First a log about 8 inches in diameter was placed across the stream from bank to bank about 3 feet above the streambed. Its ends were embedded in the banks. Then posts about 4 inches in diameter were placed against the crosslog on the upstream side, sloping down to the streambed at an angle of about 45 degrees. The posts, spaced about 4 inches apart, were spiked to the crosslog.

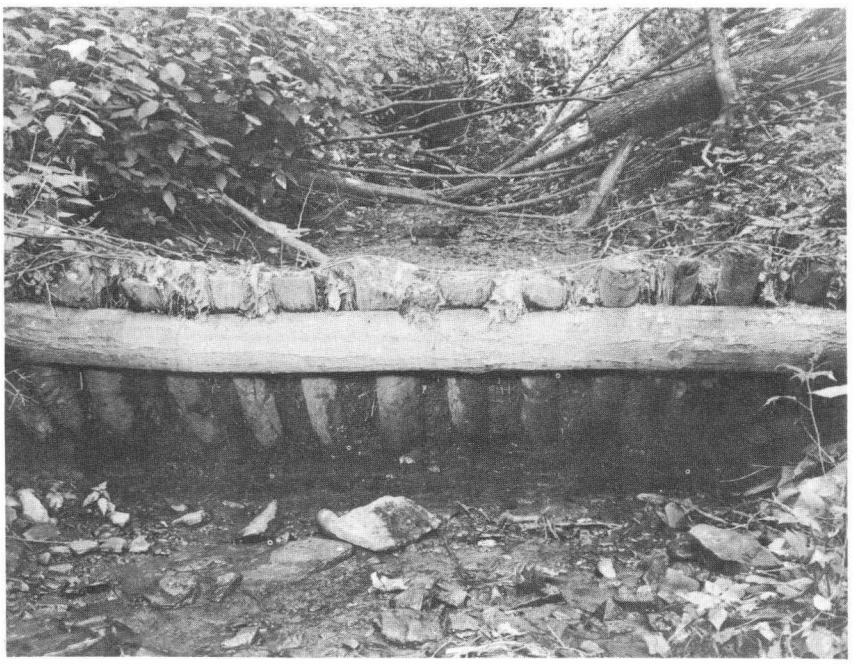

Figure 1.--*Looking upstream at one of the filter dams. The dam is made of a crosslog, posts, stock wire, and straw.*

Stock wire was then laid on the posts. A 6-inch layer of straw was laid on this, and another piece of stock wire was laid on top. Tie wires were used to hold the posts and the two pieces of stock wire together.

When completed, the filter dams were about 10 feet wide. In low-flow periods, water flowed through them; in high-flow periods it flowed both through and over them. The cost in material and labor was about $15 for each filter dam, not including the value of the small amount of timber cut at the site.

During the logging operation, water turbidity of the stream measured as high as 5,000 turbidity units (a turbidity unit corresponds roughly to one part of soil per million parts of water).

In the year since start of the logging job, the four filter dams caught a total of about 350 cubic feet of sediment. Most of this was trapped during the 2 months when logging was in progress. Though the filter dams trapped a considerable portion of the sediment, they by no means trapped all of it. However, the 350 cubic feet that was trapped amounts to an average of 70 parts of soil per million parts of water (by volume) of the total annual flow of

the watershed. During stormflows much more than 70 ppm. was trapped; most of the time the catch was less. For a simple and inexpensive installation, this seemed a worthwhile accomplishment.

Because this study was limited, it permits only conjectures as to the proportion of the total sediment caught by the filter dams, and as to final disposition of the trapped materials. Since the last filter dam downstream caught by far the smallest amount of sediment, additional filter dams probably would have added but little to the catch. Thus, for the type of sediment susceptible to screening by these filter dams, the proportion caught may have been considerable. Nevertheless, it was apparent that much sediment escaped.

In time, the trapped materials may move downstream as the filter dams disintegrate. To avoid this, sediment could

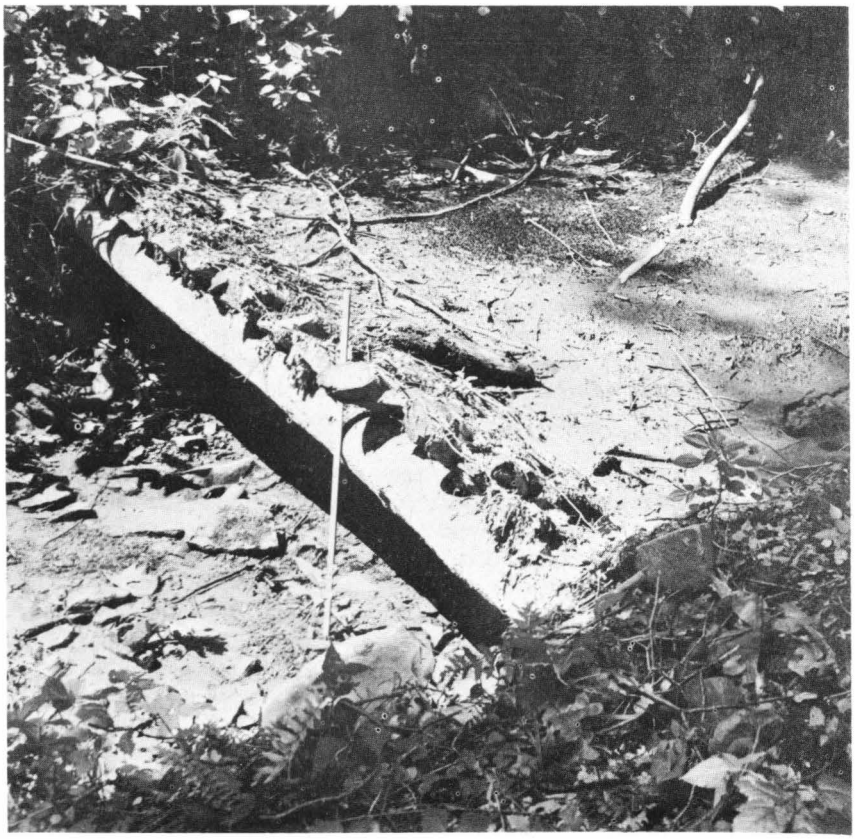

Figure 2.--*One of the filter dams as seen from above, showing the sediment trapped in the streambed.*

be shoveled out periodically; or possibly the sediment could be stabilized by seeding or planting. An alternative might be to construct the filter dams of more durable materials.

Perhaps further research can develop more efficient devices than the one described here. If so, they might be useful in helping to safeguard downstream recreation and fish-habitat water values from logging-road sediment carried by small mountain streams.

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